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DESCRIPTION OF A NEW SPECIES OF *MURINA* FROM VIETNAM (CHIROPTERA: VESPERTILIONIDAE: MURININAE)

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ABSTRACT

During an intensive field survey in 2006 and 2007 a series of three specimens of a white-bellied and relatively large *Murina* species was collected in primary forest on limestone karst in Kim Hy Nature Reserve, Bac Kan Province, Vietnam. A further specimen of the same species was caught in 1998 in semi-degraded evergreen forest in Pu Mat National Park, Nghe An Province, Vietnam. The specimens, initially considered to be close to *Murina leucogaster* or a 'larger form' of *Murina huttoni* (respectively), were subsequently re-examined and are here described as a new species belonging to the "cyclotis-group". The species is characterized by its large size, insertion point of plagiopatagium, and dental features. Currently, it is known from northern and central Vietnam.

Key words: Chiroptera, karst research, *Murina* sp. nov., taxonomy, tube-nosed bats, Vietnam

[See Editor's Note, page 10]

INTRODUCTION

Simmons (2005) included eight species of *Murina* (tube-nosed bats, known exclusively from Asia) from mainland southeastern Asia (Myanmar to Vietnam, south to peninsular Malaysia). Subsequently, a new taxon, *Murina harrisoni*, was described from Cambodia (Csorba and Bates 2005) and new records for Thailand were included in Bumrungsri et al. (2006).

The nine species belong to two species groups, which are defined on the basis of dental features (Corbet and Hill 1992; Koopman 1994). In mainland south-eastern Asia, the "suilla-group" includes *M. aurata*

Milne-Edwards 1872, *M. leucogaster* Milne-Edwards 1872, *M. suilla* (Temminck 1840), and *M. tubinaris* (Scully 1881). In this group, the first upper incisor (I^2) is situated anterior to the second (I^3) and the crown area of the first premolar (P^2) is half or less that of the second (P^4). In the "cyclotis-group", which includes *M. aenea* Hill 1964, *M. cyclotis* Dobson 1872, *M. harrisoni* Csorba and Bates 2005, *M. huttoni* (Peters 1872), and *M. rozendaali* Hill and Francis 1984, I^3 is situated internally adjacent to I^2 , such that I^2 is scarcely visible when viewed laterally and the crown area of P^2 is two-thirds or more that of P^4 .

A recent review by GC of the collections of tubenosed bats from southeastern Asia revealed that there is an additional tenth species of *Murina*, which is as yet undescribed. It is represented by four specimens, one of which Hendrichsen et al. (2001) had referred previously to *M. huttoni*. In this paper, they noted that it was ‘a larger form’ which shared ‘a number of characters with *M. huttonii*’ and differed from ‘a smaller form’ from central southern Vietnam, which

according to Hendrichsen et al. (2001) was ‘very similar to specimens of *M. huttonii* from India’ and indeed, represents that species. A careful re-examination of this specimen indicates that it was incorrectly assigned to *M. huttoni* and, together with three individuals subsequently collected from northern Vietnam, in fact represents a new species to science, belonging to the *Murina* “*cyclotis*-group”. It is described below.

MATERIALS AND METHODS

Comparative material.—The following comparative material was used: *Murina aenea*: PENINSULAR MALAYSIA: BM(NH) 64.770 (holotype), 75.2148, 1999.299; THAILAND: PSU-M 05.6, 05.7; *Murina cyclotis*: INDIA: BM(NH) 9.4.4.4 (holotype); MYANMAR: BM(NH) 50.484; THAILAND: 78.2383, 82.165; VIETNAM: HNHM 98.3.3., 2000.84.3.; *Murina harrisoni*: CAMBODIA: HZM 1.31316 (holotype); *Murina huttoni huttoni*: INDIA: BM(NH) 79.11.21.685 (holotype), 14.7.10.32, 16.3.25.25, 20.6.24.3; *Murina huttoni rubella*: CHINA: BM(NH) 8.8.11.6 (holotype), 8.7.25.11, 8.8.11.5, 96.12.1.1, 96.12.1.2, 97.9.3.2, 98.11.1.3; VIETNAM: HZM 2.32351, 3.32352; THAILAND: BM(NH) 79.1418; PENINSULAR MALAYSIA: BM(NH) 67.1606; *Murina puta*: TAIWAN: HNHM 98.19.4., CSOTA15; NTU FB007, FB022, FB093, KHC002, KHC005, KHC008, KHC011-013, KHC020, KHC024-026, KHC028, KHC030, KHC032; ESRI T1, T2; *Murina rozendaali*: MALAYSIA, SABAH: BM(NH) 83.36 (holotype), 84.2025, 1999.300; RMNH 32235; PENINSULAR MALAYSIA: BM(NH) 1999.301.

The museum acronyms are as follows: BM(NH): The Natural History Museum, London, Great Britain, formerly British Museum (Natural History); ESRI: Endemic Species Research Institute, Chichi, Taiwan R.O.C.; HNHM: Hungarian Natural History Museum, Budapest, Hungary; HZM: Harrison Institute, Sevenoaks, Great Britain, formerly Harrison Zoological Museum; NTU: National Taiwan University, Taipei, Taiwan R.O.C.; PSU: Prince of Songkla University, Hat Yai, Thailand; RMNH: National Museum of Natural History, Leiden, the Netherlands, formerly Rijksmuseum van Natuurlijke Historie.

Measurements.—The forearm (FA) measurements were either compiled from the literature (therefore no sample size is provided in Table 1) or taken by the authors from dry or alcohol preserved museum specimens with 0.1 mm accuracy. Craniodontal measurements were taken to the nearest 0.01 mm by the authors with digital calipers under a stereo-microscope. The definitions of measurements follow a previous study by Csorba and Bates (2005): STOTL: total length of skull – from the anterior rim of alveolus of the first upper incisor to the most projecting point of the occipital region; GTL: greatest length of skull – greatest antero-posterior diameter of skull, taken from the most projecting point at each extremity; CBL: condylobasal length – from the exoccipital condyle to the posterior rim of alveolus of the first upper incisor; CCL: condylo-canine length – from the exoccipital condyle to the anterior alveolus of the canine; CCW: upper canine width – taken across the outer borders of upper canines; M³M³W: upper molar width – taken across the outer crowns of the last upper molars; ZYW: zygomatic width – the greatest width of the skull across the zygomatic arches; MAW: mastoid width – the greatest distance across the mastoid region; IOW: interorbital width – the least width of the interorbital constriction; CM³L: maxillary tooththrow length - from the front of upper canine to the back of the crown of the third molar; CP⁴L: upper canine-premolar length – from the front of the upper canine to the back of the crown of the posterior premolar; ML: length of mandible – from the anterior rim of the alveolus of the first lower incisor to the most posterior part of the condyle; CM₃L: mandibular tooththrow length – from the front of the lower canine to the back of the crown of the third lower molar; CP₄L: lower canine-premolar length

– from the front of the lower canine to the back of the crown of the posterior premolar; CPH: height of the coronoid process – taken perpendicularly from the

extremity of the coronoid process to the indentation of the ramus mandibulae.

SYSTEMATIC DESCRIPTION

Murina tiensa sp. nov.

Murina huttonii Hendrichsen et al. 2001

Holotype.—HZM.2.38178 (field number NF.030307.3), adult female, in spirit, skull removed. Collected by N. Furey on 3 March 2007.

Type locality.—An Tinh commune, Na Ri district of Kim Hy Nature Reserve, Bac Kan Province, Vietnam, 22°11.725'N, 106°01.638'E, ca. 750 m a.s.l.

Paratypes.—HNHM 2007.28.1. (field number NF.260407.1), collected by N. Furey on 26 April 2007, Vu Muon commune, Bach Thong district of Kim Hy Nature Reserve, Bac Kan Province, Vietnam, 22°14.835'N, 105°58.693'E, ca. 750 m a.s.l.; NF.301006.1 (housed in the collection of Vu Dinh Thong, Institute of Ecology and Biological Resources, Hanoi, Vietnam), adult male, in spirit, skull removed, collected by N. Furey on 30 October 2006, An Tinh commune, Na Ri district of Kim Hy Nature Reserve, Bac Kan Province, Vietnam, 22°11.799'N, 106°02.130'E, ca. 650 m a.s.l.

Referred material.—HZM 1.31525 (field number PM-41), adult female, skinned ex spirit (on 25 November 1998) and skull, collected by Benjamin Hayes between 18-22 October 1998, Khe Bu River Valley, Pu Mat National Park, Nghe An Province, Vietnam, approximately 18°58'N, 104°46'E, 150-220 m a.s.l.

Diagnosis.—This is a large species of *Murina* with a forearm length of 35.2-40.1 mm (Table 1). The fur is a uniform dirty white on the ventral surface (Fig. 1). The plagiopatagium is attached to the base of the first claw. The greatest length of skull is over 17.8 mm. The lateral profile of the anterior part of the skull is evenly ascending, without a marked concavity over the orbits, and with the rostrum not uptilted

(Fig. 2a). The first upper premolar (P²) is very large, antero-laterally compressed, with its crown area approximately two-thirds that of the second (P⁴) (Fig. 3). The mesostyle of the first (M¹) and second (M²) upper molars are not reduced but the labial (outer) face of these teeth is concave in the midpart (Fig. 4). The mandible is robust, with a high coronoid process; the length of mandible is over 11.9 mm.

Description.—A relatively large-sized species of its genus with a forearm length of 35.2-40.1 mm. The hairs of the dorsal pelage are light yellowish-red basally, gradually darkening towards the tips, which are reddish brown; there is no definite colour banding. The fur is a uniform dirty white on the ventral surface (Fig. 1). The cheeks have darker hairs, but there is no distinct facial mask. The ear is 15.6-17.2 mm in length and the conch is without an emargination on the posterior border. The tragus is typical of the genus and 7.0-8.1 mm in length. The plagiopatagium is attached to base of the claw of the first toe. The tail membrane is densely and evenly furred above.

The skull is not domed. The lateral profile of the anterior part of the skull is only slightly ascending and without a marked concavity over the orbits (Fig. 2a). The sagittal crest is well developed, extending posteriorly to the lambda; the lambdoid crest is well defined. The length of the narial emargination considerably exceeds its width. There is no basioccipital fissure. The maxillary toothrows are nearly parallel. The dentition is robust. The second upper incisor (I³) is situated alongside rather than posterior to the first (I²), such that I² is not visible when viewed laterally (Fig. 2a). I² is distinctly but only slightly taller than I³ and is much less than half the height of the upper canine (C¹). Both upper (C¹) and lower (C₁) canines are well developed, the height and basal area of each exceeds that of the corresponding second premolar (P⁴ and P₄). The crown area of the first upper premolar

Table 1. Selected external and craniodental measurements of five species from the Murina "cyclotis-group" (in mm). FA: forearm length; STOTL: total length of skull; CM³L: maxillary tooththrow length; CP⁴L: upper canine-premolar length; ML: mandible length; CM₃L: mandibular tooththrow length; CPH: height of the coronoid process. Sample size in parentheses.

	<i>M. tiensa</i> n. sp.	<i>M. harrisoni</i> (holotype)	<i>M. huttoni</i>	<i>M. puta</i>	<i>M. rozendaali</i>
FA	35.2 - 40.1	35.9	33 - 37	30 - 37	31 - 34
STOTL	17.39 - 19.43 (4)	18.39	16.95 - 18.15 (12)	16.63 - 18.09 (20)	14.81 - 16.05 (4)
CM ³ L	5.82 - 6.68 (4)	6.49	5.73 - 6.23 (15)	5.79 - 6.26 (20)	5.16 - 5.53 (5)
CP ⁴ L	2.84 - 3.36 (4)	3.37	2.65 - 2.99 (15)	2.69 - 3.01 (20)	2.44 - 2.88 (5)
ML	11.95 - 13.62 (4)	13.03	11.17 - 12.54 (14)	11.43 - 12.45 (17)	10.3 - 10.89 (5)
CM ₃ L	6.30 - 7.21 (4)	7.15	6.26 - 6.70 (14)	6.34 - 6.78 (17)	5.76 - 6.14 (5)
CPH	4.38 - 5.52 (4)	5.21	3.87 - 4.54 (13)	3.86 - 4.51 (17)	3.33 - 4.03 (5)



Figure 1. Living specimen of *M. tiensa* sp. nov. (paratype, NF.301006.1). Photo by Neil Furey.

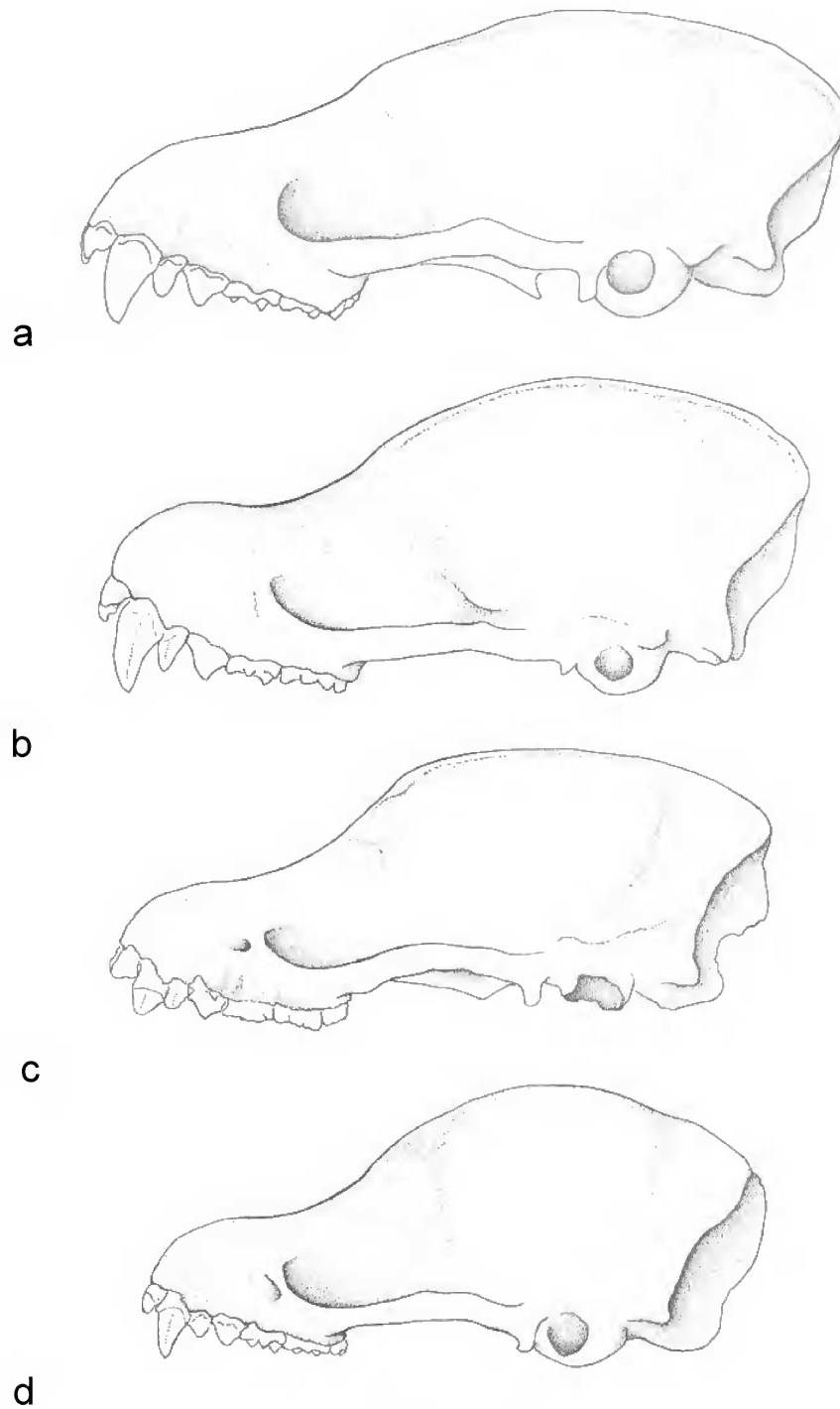


Figure 2. Lateral view of the skulls of a) *M. tiensa* sp. nov. (holotype, HZM 2.38178) from Vietnam, b) *M. harrisoni* (holotype, HZM 1.31316) from Cambodia, c) *M. huttoni* (holotype, BM(NH) 79.11.21.685) from India, d) *M. rozendaali* (holotype, BM(NH) 83.360) from Sabah, Malaysia. Scale = 5 mm. Drawings by Gabor Csorba and Anna Honfi.

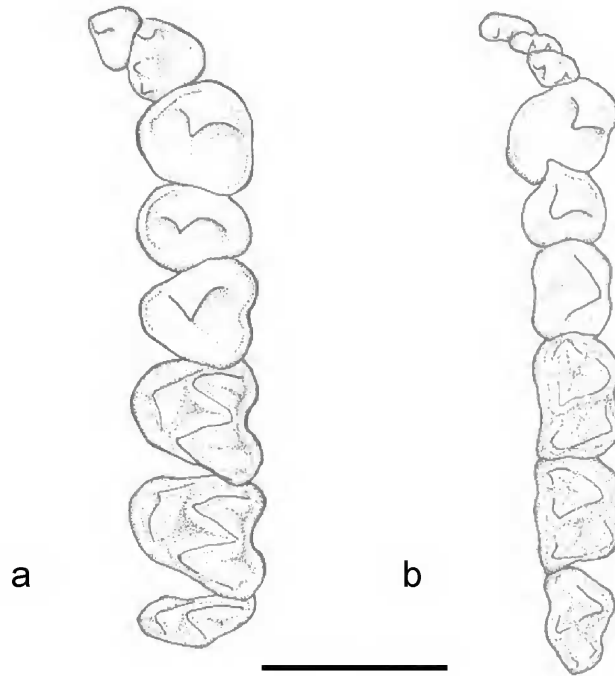


Figure 3. Occlusal view of left upper (a) and right lower (b) dentition of *M. tiensa* sp. nov. (holotype, HZM 2.38178) from Vietnam. Scale = 2 mm. Drawings by Gabor Csorba and Anna Honfi.

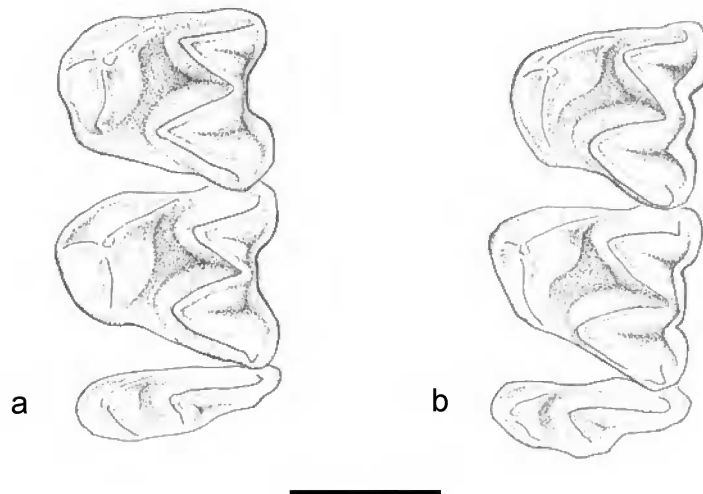


Figure 4. Occlusal view of upper molars of a) *M. tiensa* sp. nov. (holotype, HZM 2.38178) and b) *M. huttoni* (HZM 3.32352) both from Vietnam. Scale = 1 mm. Drawings by Gabor Csorba and Anna Honfi.

(P²) is about two-third to that of P⁴ (Fig. 3). The height of the first premolars (P², P₂) is about equal to that of the second (P⁴, P₄) in both upper and lower toothrows. The first (M¹) and second (M²) upper molars have a distinct mesostyle although the labial (outer) face of these teeth lacks a protuberance in their mid-part (Fig. 4). The metacones of the first (M¹) and second (M²) upper molars are distinctly higher than the paracones. The first (M₁) and second (M₂) lower molars have well developed talonid, each with a well defined hypoconid and entoconid. The craniodental measurements (in mm) of the holotype are as follows: STOTL 19.43; GTL 19.76; CBL 17.32; CCL 17.11; CCW 5.03; M³M³W 6.17; ZYW 11.09; MAW 9.49; IOW 4.52; CM³L 6.68; CP⁴L 3.36; ML 13.62; CM₃L 7.21; CP₄L 3.22; CPH 5.52.

Etymology.—The specific name *tiensa* is the Vietnamese for ‘fairy’ and refers to the mysterious and concealing nature of these rare forest dwelling bats. Its proposed English name is ‘fairy tube-nosed bat’.

Comparison with Other Species.—On the basis of its dentition, *M. tiensa* evidently belongs to the “*cyclotis*-group”. The second upper incisor (I³) is lateral to the first (I²); the basal area of upper canine (C¹) is larger than that of the second premolar (P⁴) and the basal area of the first premolar (P²) is about equal to that of P⁴. Within the “*cyclotis*-group”, it is distinguished from *M. aenea* and *M. cyclotis* by shape of the mesostyle of the first and second upper molars (M¹ and M²). In these latter two taxa, the mesostyle is greatly reduced or absent; in *M. tiensa*, it is well defined.

It shares the following dental characters with *M. harrisoni*, *M. huttoni*, *M. puta* (from Taiwan), and *M. rozendaali*: the mesostyle of the first (M¹) and second (M²) molars not reduced and the hypoconid and entoconid of the first (M₁) and second (M₂) lower molars well defined. However, *M. tiensa* can be readily separated from them by a number of other characters. In comparison to *M. harrisoni*, which is of a similar size cranially, the insertion point of plagiopatagium in *M. tiensa* is at the base of the claw whereas in *M. harrisoni* it is at the base of toe. In the skull, the anterior part of the rostrum is almost straight; in *M. harrisoni* it is conspicuously bulbous (Fig. 2).

In comparison to *M. huttoni* (and the morphologically very similar Taiwanese *M. puta*) the ventral pelage of *M. tiensa* is whitish, whereas in *M. huttoni* and *M. puta* it

is grey-brown or light grey. In *M. tiensa*, the profile of the anterior part of the skull is almost straight, whereas in the other two taxa there is a conspicuous concavity over the orbits (Fig. 2). In the dentition, the labial face of the first M¹ and second M² upper molars is flat adjacent to the mesostyle in *M. tiensa*; in *M. huttoni* and *M. puta*, it is distinctly convex (Fig. 4).

In comparison to *M. rozendaali*, the forearm and all craniodental measurements are much larger in *M. tiensa* (Table 1). In addition, the braincase appears almost flattened as compared to the distinctly domed skull of *M. rozendaali* (Fig. 2) and the first premolar (P²) is about equal in height to the second (P⁴), whereas in *M. rozendaali* it is considerably shorter.

Habitat.—Kim Hy Nature Reserve covers an area of roughly 150 km² (15,461 ha) and is surrounded by a bufferzone of 20,528 ha (Tordoff et al. 2004). According to the classification of MacKinnon (1997), the natural vegetation types at Kim Hy are limestone forest and submontane dry evergreen forest. The south, center, and west of the nature reserve (where the type series originates from) comprise a large area of limestone karst which is almost entirely forested. Several large caves are present within the area. The holotype and male paratype were collected by means of a mist-net and a four-bank harp-trap (respectively) in a valley vegetated in closed-canopy karst forest in pristine condition and situated deep within the southern interior of Kim Hy Nature Reserve. The female paratype was netted in a valley on the western flank of Kim Hy Nature Reserve. Forests on valley floors within the latter area are heavily degraded (including an abundance of wild banana) or cleared for agriculture, although forests on hillsides and ridgetops (where the specimen was collected) are comparatively less disturbed and for the most part retain their structure and canopy cover.

The fourth known specimen was collected at an altitude of 150–220 m a.s.l. from Khe Bu river valley in Put Mat National Park in October 1998. It was netted flying low over a stream in semi-degraded evergreen forest (Ben Hayes, pers. comm.). According to Hayes and Howard (1998), the Park is characterized by large areas of forest, both primary and degraded, areas of slash and burn, and extensive areas of limestone karst.

According to the available data (e.g., Flannery 1990; Francis 1997; Maeda and Matsumura 1998; Francis et al. 1999) and personal observations, species of the genus *Murina* are exclusively forest-dwellers although at least some species can tolerate disturbance

and also occur in secondary forests.

Distribution.—The species is currently only known from two localities in Vietnam.

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Editor's Note: This is a corrected version of OP 268, issued 3 July 2007. In the original printing of this paper, a printer's error resulted in the order of the crania in Figure 2 (page 5) being changed. This error is corrected herein. Based on our reading of the 4th edition of the International Code of Zoological Nomenclature, we do not believe that this error affects the availability of the name *Murina tiensa* or its date of publication; therefore, this corrected version of the publication bears the same date as the original publication. If you see a copy of this publication that lacks this note, please destroy it because it contains the original printer's error.--RJB